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Observations at the nest of the Blue-headed Bee-eater *Merops muelleri*

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The attractive Blue-headed Bee-eater *Merops muelleri* is poorly-known throughout its rainforest range from Mali to Zaïre, with an outlying population in East Africa in the forests of Kakamega, South Nandi and Mt Elgon, western Kenya (Fry *et al.* 1992). Only four nests have been described, three from Cameroon, from mid-January, late January and February (Fry 1984), and one from Gabon (Fry *et al.* 1992). For East Africa, Brown & Britton (1980) note one definite breeding record (in March) and two possible records (in April and May). *M. muelleri* did not appear to be breeding in Kakamega in May 1995 (Njoroge 1995).

We made observations at the nest of a pair of *M. muelleri* in Kakamega Forest Reserve from 10 to 21 February 1996, in the finger of degraded primary forest along the main entrance road north of the Kenya Wildlife Service office. This period appeared to be the peak breeding season for this species, for two other pairs were also observed: one in the canopy in the 'Zimmerman Grid', in the Isecheno Nature Reserve, on 16 February; and another in the finger of forest along the main entrance road (just north of the entrance to the Litali Trail). This last pair was observed taking food to a nest-hole on the ground approximately 10 m west of the road on 14 February, and by 15 February they had reportedly fledged three young. A further single individual was seen on the Litali Trail on 10 February.

Nest description

The nest of the pair observed was in a tunnel in the ground, in soil raised around the roots of a large tree (height 20 m; dbh 50 cm). It was only 100 m into the forest, and only 3 m east of the main entrance road to the Forest Reserve. The nest hole was 5 cm in diameter, and 50 cm above the surrounding forest floor. It faced east, away from the road. Its depth is unknown. The previously described nests of the species have similarly been in holes in the ground: in a sawyer's pit; in wayside banks; and in a burrow by a forest path (Fry *et al.* 1992).

Foraging success

We collected foraging data over ten (unequal) periods for a total of 10 h (Table 1). The species is sexually monomorphic and we could not distinguish individual birds, so we pooled data for both members of the pair. Often, one of the pair would retire into the canopy east of the road (presumably to forage for itself), and so the absolute totals of sallies and catches per pair are probably incomplete. When foraging for food to take to the nest, the birds would generally sally from a branch of a small sapling, 2 m high and 2 m north of the nest hole. They always returned to this branch (which was in full view

of the road, from where we made our observations) for 30 to 60 s, possibly to scan for potential nest-predators, before visiting the nest. We are confident that these data are complete.

Table 1. *Foraging success of a breeding pair of* M. muelleri. *The figures in brackets are per hour, with standard deviations given for the totals per hour*

Period	Sallies	Catches	Nest visits
14 February, 12:30–14:00	41 (27)	21 (14)	16 (11)
14 February, 18:00–18:30	3 (6)	3 (6)	3 (6)
15 February, 09:30–10:30	29 (29)	10 (10)	9 (9)
17 February, 17:00–18:00	37 (37)	23 (23)	13 (13)
18 February, 08:00–09:00	18 (18)	9 (9)	9 (9)
19 February, 15:45–17:00	12 (10)	9 (7)	8 (6)
20 February, 12:30–13:45	30 (24)	15 (12)	11 (9)
20 February, 16:45–17:15	10 (20)	10 (20)	6 (12)
21 February, 09:15–10:30	28 (22)	17 (14)	12 (10)
21 February, 14:45–15:30	23 (31)	14 (19)	10 (13)
Total	231 (23 ± 9)	131 (13 ± 6)	97 (10 ± 3)

Table 1 shows that the birds had a foraging success of approximately 55 per cent. Prey caught but not taken to the nest were eaten by the birds themselves. Since the data on number of catches are not complete, we assume that the birds took a lower percentage of their prey to their nest than the data indicate (77 per cent). The birds visited the nest approximately ten times per hour, with feeding apparently trailing off at dusk (14 February, 18:00–18:30), when the birds spent most of their time in the canopy. The high foraging rate on 17 February, 17:00–18:00, was immediately after a long (2-h), heavy thunderstorm.

Prey items

The only prey items previously reported for *M. muelleri* are flies and Hymenoptera: a worker honeybee, a large fly, and a small ichneumon-fly, from a regurgitated pellet (Fry 1984), and wasps (Njoroge 1995). We recorded prey items, where possible, for each catch made by the pair.

Table 2 suggests that *M. muelleri* has a broad insect diet, similar to that found by Fry & Gilbert (1983) for the Black-headed Bee-eater *M. breweri* (another Central African rainforest species). The commonest prey caught (about 53 per cent of the diet) were unidentified flies or Hymenoptera, at least one-third of which were eaten by the birds themselves. Lepidoptera (23 per cent) also made up a significant proportion of the diet. The larger prey items caught were generally taken to the nest. There did not appear to be a time-of-day effect on prey type caught.

On 46 occasions (35 per cent of successful captures), the birds were observed to hold the captured prey in the tip of their bill and knock it vigorously against their perch. Such behaviour has been noted (e.g., Fry 1984) as a means of dealing with stinging

Table 2. *Prey items of a breeding pair of* M. muelleri

Prey item	Total caught	% of total	Fed to young	% fed to young
Fly/Hymenoptera	53	41	34	64
Lepidoptera	30	23	24	80
Odonata	8	6	8	100
Orthoptera	5	4	5	100
Coleoptera	3	2	3	100
Unknown	32	24	23	72

insects. However, only eight of our observations were of potentially stinging insects. The other 38 cases were the butterflies and dragonflies caught, which were knocked against the perch, sometimes for up to three minutes, in order to break off their wings before they were taken to the nest. On one occasion a butterfly was caught and knocked against the branch for 1 minute, but then managed to escape (this case was not counted as a successful capture).

Other observations and discussion

As noted by Fry (1984), the birds, when perched, continually pumped their tails back and forth through a small arc. The birds were silent throughout, and, although they occasionally perched on the same branch together (generally facing the same direction—towards the road), no direct interactions between them were seen. Also, no interspecific interactions were noted.

Fry (1984) observed a pair of males courtship-feeding a female in Kakamega, and speculated that the species breeds, on occasion, in trios, with the third bird as a helper-at-the-nest. However, we observed no evidence of this during our time in Kakamega. Records from May 1995 and April and May 1996 were also of pairs only (Njoroge 1995, Imboma *et al.* 1996), but a group of six birds, including two juveniles, was seen on 16–18 August at Isecheno (Imboma *et al.* 1996). Our observations (and observations of juvenile birds in Kakamega at the end of April and the beginning of May, Imboma *et al.* 1996) support the suggestion by Brown & Britton (1980) that in Kakamega the breeding season of *M. muelleri* coincides with the end of the dry season.

On several occasions small boys were seen throwing and catapulting stones at the bee-eaters (and also at other birds and at monkeys), without success. On questioning, they claimed variously that they wanted to eat the birds, or that they just wanted to hold them. Although the population of *M. muelleri* in Kakamega may only be a few hundred individuals (Fry *et al.* 1992), and although such persecution is undoubtedly illegal and should be discouraged, it is unlikely to pose much of a threat to the birds. Considerably more serious must be the continued grazing and trampling by cattle throughout the forest, which may significantly reduce the breeding success of ground hole nesters such as *M. muelleri* if the birds, as observed in this case, nest near to open areas.

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